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(71)Applicant : **FUJI PHOTO FILM CO LTD**
(72)Inventor : **ITO YOSHIHIRO**
NISHINO NAOYUKI
ISHII SHUICHI

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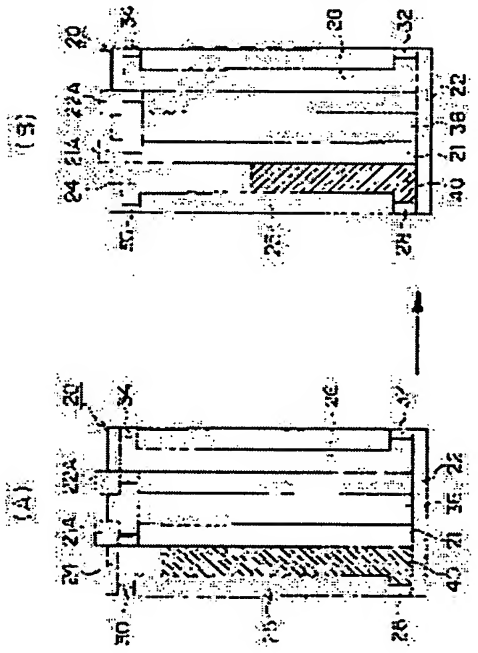
(54) FUEL CELL, ELECTRONIC EQUIPMENT, MOBILE TERMINAL, AND CAMERA

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a fuel cell, an electronic equipment or a camera wherein the used condition of fuel can be confirmed easily by vision.
SOLUTION: The fuel 40 in which water and bromothymol blue solution (BTB solution) are mixed in colorless and transparent and neutral methanol is housed in a fuel chamber 24. The fuel 40 is decomposed into hydrogen ion, electron, and carbon dioxide (CO2) by catalytic reaction at a fuel electrode 21. When the CO2 discharged on the fuel chamber 24 side is dissolved into the water of the fuel 40, the fuel 40 colored in green (as shown in the upper right hatching) by the BTB solution is acidified and turns yellow (as shown in the upper left hatching). Because generated amount of the CO2 is increased depending on the consumption of the fuel 40, the dissolved amount of the CO2 is increased, and the degree of acidity is enhanced, and therefore the color of the fuel 40 is varied corresponding to the used amount of the fuel 40. That is, by confirming the color of the fuel 40 visually other than the liquid level of the fuel 40, the used amount of the fuel 40 can be grasped easily, and the convenience is improved.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1]
The cell section which consisted of a fuel electrode including a catalyst, an air pole including a catalyst, and an electrolyte membrane inserted into said fuel electrode and said air pole,
The combustion chamber which is arranged at said fuel electrode side and holds a fuel,
The air chamber to which it is arranged at said air pole side, and air is supplied,
It is a fuel cell equipped with the recovery room which collects the fuel comes products generated by the catalytic reaction of said fuel in said fuel electrode,
The fuel cell characterized by providing the coloring agent containing an indicator in the interior of a room of either said combustion chamber and said recovery room.
[Claim 2]
The fuel cell according to claim 1 characterized by forming the outer wall of said combustion chamber or said recovery room by the transparence member.
[Claim 3]
The fuel cell according to claim 1 or 2 characterized by having a pressurization means to pressurize the interior of a room of either said combustion chamber and said recovery room at least.
[Claim 4]
It is a fuel cell given in claim 1 thru/or any of 3 they are. [which is characterized by preparing the vapor-liquid-separation film which a liquid is intercepted / film / in said recovery room and makes a gas penetrate]
[Claim 5]
The cell section which consisted of a fuel electrode including a catalyst, an air pole including a catalyst, and an electrolyte membrane inserted into said fuel electrode and said air pole,
The combustion chamber which is arranged at said fuel electrode side and holds a fuel,
It is a fuel cell equipped with the air chamber to which it is arranged at said air pole side, and air is supplied,
The fuel cell characterized by holding said fuel with which the coloring agent was added in said combustion chamber.
[Claim 6]
The fuel cell according to claim 5 characterized by changing the color of said fuel by said coloring agent according to the amount of the gas generated by the catalytic reaction of said fuel in said fuel electrode.
[Claim 7]
The fuel cell according to claim 6 characterized by establishing a pressurization means to make said gas remain in said combustion chamber, and to pressurize the inside of said combustion chamber.
[Claim 8]
The fuel cell according to claim 6 or 7 characterized by for said gas being a carbon dioxide and being the indicator which said coloring agent is colored with a carbon dioxide.
[Claim 9]

The cell section which consisted of a fuel electrode including a catalyst, an air pole including a catalyst, and an electrolyte membrane inserted into said fuel electrode and said air pole,
The combustion chamber which is arranged at said fuel electrode side and holds a fuel,
The air chamber to which it is arranged at said air pole side, and air is supplied,
The recovery room which collects the fuel comes products generated by the catalytic reaction of said fuel in said combustion chamber,
It is preparation **********,
The fuel cell characterized by changing the color of said absorption member by said coloring agent according to the amount of said collected fuel comes product while holding the absorption member which absorbed the coloring agent in said recovery interior of a room.
[Claim 10]
Said recovery room is a fuel cell according to claim 9 characterized by collecting the air comes products generated by said air pole.
[Claim 11]
It is the fuel cell according to claim 9 or 10 characterized by intercepting a liquid in said recovery room and preparing the vapor-liquid-separation film which makes a gas penetrate.
[Claim 12]
Claim 10 characterized by said fuel comes product being the indicator which said air comes product is water and said coloring agent is colored by the carbon dioxide with a carbon dioxide, or a fuel cell given in 11.
[Claim 13]
A fuel cell given in claim 1 thru/or any of 4, 8, and 12 they are. [which is characterized by said indicator being bromthymol blue liquid]
[Claim 14]
A fuel cell given in claim 1 thru/or any of 4, 8, and 12 they are. [which is characterized by said indicator being a litmus solution]
[Claim 15]
A fuel cell given in claim 5 thru/or any of 12 they are. [which is characterized by forming the outer wall of said combustion chamber or said recovery room by the transparence member]
[Claim 16]
A fuel cell given in claim 1 thru/or any of 15 they are. [which is characterized by having a detection means to detect the color of said coloring agent]
[Claim 17]
Electronic equipment characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.
[Claim 18]
The personal digital assistant characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.
[Claim 19]
The camera characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to electronic equipment equipped with fuel cells, such as a methanol direct mold fuel cell (DMFC) which uses fuels, such as a methanol (it is also called "methyl alcohol"), and a fuel cell, a personal digital assistant, and a camera.
[0002]
[Description of the Prior Art]
A methanol direct mold fuel cell is a type which obtains electrical energy through electrolyte membranes, such as proton electric conduction film, by supplying directly the methanol (CH3OH) with which water was mixed to a fuel electrode, and supplying oxygen to an air pole. Moreover, in a methanol direct mold fuel cell, a carbon dioxide (CO2) is generated by the catalysis of a fuel electrode as a by-product, and water (2H2O) is generated by the catalysis of an air pole as a by-product. And the amount of the methanol (fuel) used held in the combustion chamber carried out detecting change of the depth of shade of the coloring matter enclosed with the recovery bag which collects these by-products etc., and was detected (for example, patent reference 1 reference).
[0003]
[Patent reference 1]
JP,2003-36879,A
[0004]
[Problem(s) to be Solved by the Invention]
By the way, the above-mentioned methanol is a transparent and colorless liquid, and melts into water etc. Moreover, if a methanol is poisonous on the body and is usually drunk 8-10g on it, it will become blind, and the lethal dose is set to 20-100g. Therefore, fuels, such as a methanol, are mistaken for water etc. and need to be made not to carry out a drink. Moreover, it is necessary to prevent mistaking for the fuel of a different class and supplying with oil.
[0005]
On the other hand, in the fuel cell indicated by the patent reference 1, since the fuel was still a transparent and colorless liquid, it had risk of mistaking for a methanol the fuel of a class which is different as mentioned above, and supplying with oil.
[0006]
Moreover, visually it detected, and it was hot, the detection sensor was needed, and the depth of shade had the problem that a residue detection device became large-scale.
[0007]
The purpose of this invention offers the fuel cell, the electronic equipment, or the camera which the operating condition of a fuel can check easily by vision in consideration of the above-mentioned fact.
[0008]
[Means for Solving the Problem]

The fuel electrode with which a fuel cell according to claim 1 includes a catalyst, and an air pole including a catalyst, The cell section which consisted of electrolyte membranes inserted into said fuel electrode and said air pole, The combustion chamber which is arranged at said fuel electrode side and holds a fuel, and the air chamber to which it is arranged at said air pole side, and air is supplied, It is a fuel cell equipped with the recovery room which collects the fuel comes products generated by the catalytic reaction of said fuel in said fuel electrode, and is characterized by providing the coloring agent which contains an indicator in the interior of a room of either said combustion chamber and said recovery room.

[0009]

In the fuel cell according to claim 1, the coloring agent containing an indicator possesses in either the recovery room and the combustion chamber. Collect fuel comes products in a recovery room, or a combustion chamber is made to remain, and an indicator is made to discolor according to the amount of a fuel comes product. By this, a user can know the residue of a fuel.

[0010]

A fuel cell according to claim 2 is a fuel cell according to claim 1, and is characterized by forming the outer wall of said combustion chamber or said recovery room by the transparence member.

[0011]

In a fuel cell according to claim 2, a user can check change of the color of a coloring agent by looking through the outer wall of a transparence member.

[0012]

A fuel cell according to claim 3 is a fuel cell according to claim 1 or 2, and is characterized by having a pressurization means to pressurize the interior of a room of either said combustion chamber and said recovery room at least.

[0013]

In a fuel cell according to claim 3, the interior of a room of either a combustion chamber and a recovery room is pressurized by the pressurization means. Here, a fuel explains effectiveness in case a carbon dioxide is generated for an indicator as bromthymol blue liquid (BTB liquid) and a fuel comes product with a methanol. The amount of dissolutions of the carbon dioxide to the water in a methanol or BTB liquid increases with the rise of the indoor pressure of a combustion chamber or a recovery room, and an acid degree becomes high. Therefore, if the interior of a room of a combustion chamber or a recovery room is pressurized by the pressurization means, as for the color of the methanol which is neutrality, green will change to yellow.

[0014]

A fuel cell according to claim 4 is a fuel cell given in any [claim 1 thru/or] of 3 they are, a liquid is intercepted in said recovery room and a gas is characterized by preparing the vapor-liquid-separation film made to penetrate.

[0015]

In a fuel cell according to claim 4, a gas frequents a recovery room with the vapor-liquid-separation film prepared in the recovery room. For this reason, since the gas collected at the recovery room is suitably discharged from a recovery room, the internal pressure of a recovery room does not go up unusually. Therefore, a recovery room does not explode or a gas does not flow backwards from a recovery room to a fuel electrode.

[0016]

In addition, the liquid of the recovery interior of a room is intercepted with the vapor-liquid-separation film, and does not begin to leak from the recovery interior of a room.

[0017]

A fuel cell according to claim 5 is a fuel cell equipped with the combustion chamber which is arranged at said fuel electrode side with the cell section which consisted of a fuel electrode including a catalyst, an air pole including a catalyst, and an electrolyte membrane inserted into said fuel electrode and said air pole, and holds a fuel, and the air chamber to which it is arranged at said air pole side, and air is supplied, and is characterized by to hold said fuel with which the coloring agent was added in said

combustion chamber.
[0018]
In the fuel cell according to claim 5, the fuel with which the coloring agent was added is held in the combustion chamber. If a generation of electrical energy of a fuel cell is performed and the amount of a fuel becomes less, the amount of a coloring agent will increase relatively to the residue of a fuel, and the concentration of a coloring agent will become high. A user can know the residue of a fuel by change of the concentration of this coloring agent.
[0019]
A fuel cell according to claim 6 is a fuel cell according to claim 5, and is characterized by changing the color of said fuel by said coloring agent according to the amount of the gas generated by the catalytic reaction of said fuel in said fuel electrode.
[0020]
In a fuel cell according to claim 6, a coloring agent (BTB liquid), for example, a bromthymol blue solution, or a litmus solution is added to a fuel, for example, a methanol. A transparent and colorless methanol is colored green, purple, blue, etc. by this.
[0021]
In addition, since the gasoline is colored abbreviation orange (orange) and gas oil serves as **** yellow, in coloring fuels, such as a methanol, for example, let the colors of the fuel of the time of coloring be colors other than the abbreviation orange of a gasoline, or the **** yellow of gas oil.
[0022]
For example, the methanol with which it was colored by coloring agents, such as BTB liquid, and water was mixed is held in a combustion chamber. And if the above-mentioned methanol carries out catalytic reaction with a fuel electrode, a carbon dioxide (gas) will generate and this generated carbon dioxide will dissolve in the water in a methanol.
[0023]
That is, since the amount of dissolutions of a carbon dioxide increases whenever it uses the methanol which is a fuel, the color of a fuel changes according to the amount of the fuel used. Therefore, since the color of a fuel changes according to the amount of the fuel used, by recognizing the color of a fuel other than the oil-level level of a fuel visually, the amount of the fuel used can grasp easily and convenience improves.
[0024]
Moreover, mistaking the fuel of a different class to it and refueling it, since the coloring agent for identifying the fuel of a different class is added to the fuel (for example, assignment fuels, such as a methanol) of the assignment with which a fuel cell is filled up is prevented.
[0025]
A fuel cell according to claim 7 is a fuel cell according to claim 6, makes said gas remain in said combustion chamber, and is characterized by establishing a pressurization means to pressurize the inside of said combustion chamber.
[0026]
In a fuel cell according to claim 7, the amount of dissolutions of the carbon dioxide to the water in a methanol increases with the rise of the pressure of a combustion chamber, and an acid degree becomes high. Therefore, if the inside of a combustion chamber is pressurized by the pressurization means, as for the color of the methanol which is neutrality, green will change to yellow.
[0027]
It is characterized by being a fuel cell according to claim 6 or 7, for said gas being a carbon dioxide, and a fuel cell according to claim 8 being an indicator which said coloring agent is colored with a carbon dioxide.
[0028]
A carbon dioxide dissolves into the moisture contained in the fuel in a combustion chamber, and the indicator contained in a fuel is made to discolor in a fuel cell according to claim 8. By this, the residue of a fuel can be known by change of the color of an indicator. "Change of a color" said here is not

change of the depth of shade but becoming yellow from green, and it is easy to check by looking for a user. In addition, a carbon dioxide is dissolved by the moisture contained in an indicator when an indicator is a liquid.

[0029]

The fuel electrode with which a fuel cell according to claim 9 includes a catalyst, and an air pole including a catalyst, The cell section which consisted of electrolyte membranes inserted into said fuel electrode and said air pole, The combustion chamber which is arranged at said fuel electrode side and holds a fuel, and the air chamber to which it is arranged at said air pole side, and air is supplied, While being a fuel cell equipped with the recovery room which collects the fuel comes products generated by the catalytic reaction of said fuel in said combustion chamber and holding the absorption member which absorbed the coloring agent in said recovery interior of a room It is characterized by changing the color of said absorption member by said coloring agent according to the amount of said collected fuel comes product.

[0030]

In a fuel cell according to claim 9, the fuel comes products generated by the catalytic reaction in a fuel electrode are collected by the stripping section. Coloring agents, such as for example, a bromthymol blue solution (BTB liquid) and a litmus solution, are absorbed by the stripping section.

[0031]

And for example, a fuel dissolves the carbon dioxide collected by the stripping section when a fuel comes product was a carbon dioxide in a methanol in the moisture in a coloring agent, it is absorbed by the absorption member, and a coloring agent is made to discolor.

[0032]

That is, since the amount of the carbon dioxide absorbed by the absorption member increases whenever it uses the methanol which is a fuel, the color of an absorption member changes according to the amount of the fuel used. Therefore, since the color of a fuel changes according to the amount of the fuel used, by recognizing the color of an absorption member other than the oil-level level of a fuel visually, the amount of the fuel used can grasp easily and convenience improves.

[0033]

A fuel cell according to claim 10 is a fuel cell according to claim 9, and said recovery room is characterized by collecting the air comes products generated by said air pole.

[0034]

In a fuel cell according to claim 10, since the air comes products generated by the air pole are collected at a recovery room, an air comes product and a fuel comes product can be mixed in the recovery interior of a room. For example, when an air comes product is [a fuel comes product] a carbon dioxide with water, a carbon dioxide dissolves in water in the recovery interior of a room.

[0035]

A fuel cell according to claim 11 is a fuel cell according to claim 9 or 10, a liquid is intercepted in said recovery room and a gas is characterized by preparing the vapor-liquid-separation film made to penetrate.

[0036]

In a fuel cell according to claim 11, a gas frequents a recovery room with the vapor-liquid-separation film prepared in the recovery room. For this reason, since the gas collected at the recovery room is suitably discharged from a recovery room, the internal pressure of a recovery room does not go up unusually. Therefore, a recovery room does not explode or a gas does not flow backwards from a recovery room to a fuel electrode or an air pole.

[0037]

In addition, the liquid of the recovery interior of a room is intercepted with the vapor-liquid-separation film, and does not begin to leak from the recovery interior of a room.

[0038]

A fuel cell according to claim 12 is characterized by being the indicator by which it is the fuel cell of a publication, said fuel comes product is a carbon dioxide, said air comes product is water, and said

coloring agent is colored claim 10 or 11 with a carbon dioxide.
[0039]
In a fuel cell according to claim 12, a carbon dioxide and water are collected at a recovery room, and a carbon dioxide dissolves in water. And these are absorbed by the absorption member and make an indicator discolor. By this, the residue of a fuel can be known by change of the color of an absorption member.
[0040]
A fuel cell according to claim 13 is a fuel cell given in any [claim 1 thru/or] of 4, 8, and 12 they are, and is characterized by said indicator being bromthymol blue liquid.
[0041]
A carbon dioxide dissolves in bromthymol blue liquid (BTB liquid), and BTB liquid is made to color yellow from green (or blue) in a fuel cell according to claim 13. For this reason, a user can check change of a color by looking easily.
[0042]
A fuel cell according to claim 14 is a fuel cell given in any [claim 1 thru/or] of 4, 8, and 12 they are, and is characterized by said indicator being a litmus solution.
[0043]
A carbon dioxide dissolves in a litmus solution and a litmus solution is made to color red from purple (or blue) in a fuel cell according to claim 14. For this reason, a user can check change of a color by looking easily.
[0044]
A fuel cell according to claim 15 is a fuel cell given in any [claim 5 thru/or] of 12 they are, and is characterized by forming the outer wall of said combustion chamber or said recovery room by the transparence member.
[0045]
In a fuel cell according to claim 15, a user can check change of the color of a fuel or a water absorption member by looking through the outer wall of a transparence member.
[0046]
A fuel cell according to claim 16 is a fuel cell given in any [claim 1 thru/or] of 15 they are, and is characterized by having a detection means to detect the color of said coloring agent.
[0047]
In a fuel cell according to claim 16, since change of the color of a coloring agent is detected by the detection means, the oil supply stage of a fuel etc. can be grasped exactly and quickly.
[0048]
Electronic equipment according to claim 17 is characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.
[0049]
In a personal digital assistant according to claim 18, it is characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.
[0050]
A camera according to claim 19 is characterized by enabling wearing of a fuel cell given in any [claim 1 thru/or] of 16 them are.
[0051]
It can equip with a fuel cell given in any [claim 1 thru/or] of 16 they are with electronic equipment according to claim 17 to 19, a personal digital assistant, and a camera. For this reason, change of the color of a fuel etc. can be grasped also in the time of use of the above-mentioned electronic equipment, a personal digital assistant, and a camera etc. In addition, electronic equipment given in claims 17 and 18 and a personal digital assistant are the concepts containing a cellular phone, a personal computer, PDA (Personal Digital Assistance), etc. A camera according to claim 19 is a concept containing a film-based camera, a digital camera, a digital camcorder, a cellular phone equipped with an image pick-up function, etc.

[0052]
[Embodiment of the Invention]
Hereafter, the fuel cell 20 concerning the 1st operation gestalt of this invention is explained.
[0053]
As shown in drawing 1 , the applied part 12 of a digital camera 10 is equipped with the methanol direct mold fuel cell (henceforth a "fuel cell") 20.
[0054]
The circuit diagram of the digital camera 10 concerning this operation gestalt is shown in drawing 2 . If the release switch 23 is pushed, a shutter 31 opens, image formation of the light which entered from the lens 35 will be carried out by CCD19, and optical data will be changed into electric image data. This image data is sent to the image-processing section 37, and an image processing is carried out. The image data processed in the image-processing section 37 is saved at an archive medium 39.
[0055]
And each part which constitutes a digital camera 10 is controlled by the control section 41. The rechargeable battery 43 is connected to this control section 41, and each part which constitutes a digital camera 10 operates with the electrical energy by which the buffer was carried out to the rechargeable battery 43.
[0056]
If the electrical energy by which the buffer was carried out to this rechargeable battery 43 is insufficient, the control section 41 will operate a converter 45 and will generate a fuel cell 20. And if electrical energy is supplied from a fuel cell 20 and charge of a rechargeable battery 43 is completed, actuation of a converter 45 will be stopped and a generation of electrical energy of a fuel cell 20 will be stopped.
[0057]
As shown in drawing 3 thru/or drawing 5 , a fuel cell 20 is a type which obtains power by supplying directly the methanol which is a fuel to the negative-electrode electrode (fuel electrode) 21, and supplying air to the positive-electrode electrode (air pole) 22. And the catalyst (Pt/Ru) is included in the fuel electrode 21, and the catalyst (Pt) is included in the air pole 22.
[0058]
In addition, the fuel electrode 21 and air pole 22 of a fuel cell 20 are electrically connected to the grand terminal 15 and a power supply terminal 16, respectively. Moreover, it connects with a printed circuit board 14 electrically, and the grand terminal 15 and the power supply terminal 16 are constituted so that the power (electrical energy) from a fuel cell 20 may be supplied to the electronic parts which are not illustrated on a printed circuit board 14.
[0059]
While the combustion chamber 24 which holds a fuel is formed in the fuel electrode 21 side of a fuel cell 20, the air chamber 26 which holds air is formed in the air pole 22 side of a fuel cell 20. While the oil supply plug 28 for making a combustion chamber 24 hold a fuel in the inlet port 27 of a combustion chamber 24 is arranged, the filter 30 which makes a carbon dioxide (CO2) discharge outside is arranged at the outlet 29 of a combustion chamber 24. Moreover, the outer wall 25 of a combustion chamber 24 is fabricated with the transparent ingredient.
[0060]
Filters 32 and 34 are arranged at the inlet port 31 and outlet 33 of an air chamber 26, respectively. Moreover, the oxygen tank and waste water tank which are not illustrated are connected to the part corresponding to filters 32 and 34, respectively.
[0061]
Furthermore, between the air chamber 26 and the combustion chamber 24, the fuel electrode 21 and air pole 22 which constitute a part of cell section are arranged, where the proton electric conduction film 36 as an electrolyte membrane is inserted right in the middle. In addition, external terminal 21A of a fuel electrode 21 and external terminal 22A of an air pole 22 are arranged at the fuel cell 20, and the external terminals 21A and 22A are electrically connected to the grand terminal 15 and power supply terminal 16 which are shown in drawing 3 .

[0062]
And in the fuel cell 20, the methanol is specified as an assignment fuel with which the combustion chamber 24 is filled up (oil supply). A neutral methanol melts into water etc. with a transparent and colorless liquid, and is poisonous for the body. With the operation gestalt shown in drawing 4 , the fuel 40 which added water (H2O), and a coloring agent and the BTB liquid as an indicator to the methanol is supplied with oil and held in a combustion chamber 24.
[0063]
Here, BTB liquid is added to a methanol, because a color is attached. That is, if BTB liquid is added to a transparent and colorless methanol, a methanol will be colored green. In addition, the fuel 40 of the time of coloring was made green for preventing the misconception confusion with the gasoline or gas oil which is the fuel of a different class in distinction from the color of the gas oil of the color of the gasoline colored orange, or **** yellow.
[0064]
Then, based on drawing 4 (A) and drawing 4 (B), an operation of the fuel cell 20 concerning this operation gestalt is explained. First, after refueling a methanol in a combustion chamber 24 from an inlet port 27 in the fuel 40 which added the BTB liquid and water which are a coloring agent, the oil supply plug 28 closes an inlet port 27. Moreover, in an air chamber 26, air is supplied through a filter 32 (inlet port 31).
[0065]
And a fuel 40 is disassembled into a hydrogen ion, an electron, and a carbon dioxide (CO2) by the catalytic reaction in a fuel electrode 21. Although the above-mentioned hydrogen ion passes the proton electric conduction film 36 and moves to an air pole 22, a current generates the above-mentioned electron by being unable to pass the proton electric conduction film 36, but flowing between external terminal 21A and 22A. Moreover, if catalyzed combustion of the above-mentioned hydrogen ion which penetrated the proton electric conduction film 36 is carried out with the oxygen in an air pole 22, water (2H2O) will be generated.
[0066]
That is, the cell reaction mentioned above is "CH3OH+3/2, andO2->CO2+2H2O", and while a carbon dioxide is discharged at a combustion chamber 24 side, water (steam) is discharged at an air chamber 26 side. In addition, a carbon dioxide has the property which is easy to dissolve in water.
[0067]
And if the carbon dioxide discharged at the combustion chamber 24 side dissolves in the water in a fuel 40, the fuel 40 colored green (upward-slant-to-the-right hatching shows at drawing 4 (A)) with BTB liquid will serve as acidity, and will change to yellow (left riser hatching shows at drawing 4 (B)) (discoloration). Moreover, since the yield of a carbon dioxide increases according to consumption of a fuel 40, while the amount of dissolutions of the carbon dioxide to water also increases, an acid degree also becomes high, therefore the color of a fuel 40 changes according to the amount of the fuel 40 used.
[0068]
According to this operation gestalt, since the color of a fuel 40 changes according to the amount of the fuel 40 used, by recognizing the color of a fuel 40 other than the oil-level level of a fuel 40 visually, the amount of the fuel 40 used can grasp easily, and convenience improves. In addition, when a user judges it as the oil supply stage of a fuel 40, the fuel 40 colored again is supplied with oil in a combustion chamber 24.
[0069]
Furthermore, according to this operation gestalt, mistaking the fuel of a class which is different in a methanol, for example, a gasoline, and gas oil to it, and refueling it, since the BTB liquid for identifying the fuel of a different class was added to the methanol which is an assignment fuel is prevented. In addition, since the acid above-mentioned reaction of BTB liquid is sensitive compared with a litmus solution, a fuel 40 is discolored quickly.
[0070]
Moreover, the color sensor 38 (the fictitious outline of drawing 3 shows) which detects the color of a

fuel 40 may be formed, or you may make it establish the contrast means (color diagnostic table etc.) corresponding to change of the color of a fuel 40 in this operation gestalt. Furthermore, it is good also considering the outer wall of the digital camera 10 which counters the outer wall 25 of a combustion chamber 24 with this operation gestalt as a transparence member 18. In this case, a user can check change of the color of a fuel 40 by looking even from the outside of a digital camera 10 by the transparence member 18.

[0071]

Next, based on drawing 5 (A) and drawing 5 (B), the case where a coloring agent and an indicator are used as a litmus solution is explained. In addition, explanation is omitted about the same contents as the example of drawing 4 (A) and drawing 4 (B). Since the acid above-mentioned reaction is slow compared with BTB liquid, a litmus solution forms the pressure valve 42 which is a pressurization means in the outlet 29 of a combustion chamber 24 with this operation gestalt.

[0072]

Moreover, the amount of dissolutions to the water of a carbon dioxide increases with the rise of a pressure, and an acid degree becomes high. That is, since a carbon dioxide is the acescence when not applying a pressure in a combustion chamber 24, the reaction of a litmus solution becomes slow. Therefore, with this operation gestalt, in order to raise the reaction effectiveness of a litmus solution, a pressure is applied in a combustion chamber 24.

[0073]

If a purple litmus solution is added to a transparent and colorless methanol, a fuel 40 will be colored purple (at drawing 5 (A), hatching upward slanting to the right shows). And if the carbon dioxide discharged at the combustion chamber 24 side dissolves in the water in a fuel 40 as mentioned above, the fuel 40 colored purple with the litmus solution will serve as acidity, and will change to red (a cross line shows in drawing 5 (B)).

That is, according to this operation gestalt, since the inside of a combustion chamber 24 is pressurized by the pressure valve 42, the amount of dissolutions of the carbon dioxide to the water in a fuel 40 increases, therefore the color of a fuel 40 can be changed exactly and quickly according to the amount of the fuel used. In addition, the above-mentioned pressure valve 42 may make the safeguard which makes a combustion chamber 24 open wide provide, before the pressure in the function to adjust the pressure in a combustion chamber 24 uniformly, the function to change the pressure in a combustion chamber 24 into arbitration, or a combustion chamber 24 arrives at a critical region.

[0074]

Moreover, since the dissolution of a carbon dioxide to the water in the above-mentioned fuel 40 is changed also with temperature besides the pressure in a combustion chamber 24, you may make it form a heater etc. in the inside of a combustion chamber 24, or the combustion chamber 24 neighborhood. In this case, the thermo sensor which detects the temperature (reaction temperature) of the fuel 40 in a combustion chamber 24 is formed, and it may be made to perform the temperature control of the above-mentioned heater based on this thermo sensor.

[0075]

Next, based on drawing 6 (A) and drawing 6 (B), the case where a coloring agent is made into a color is explained. In addition, explanation is omitted about the same contents as the example of drawing 5 (A), (B), and drawing 6 (A) and (B).

[0076]

For example, if a red color is added to a transparent and colorless methanol, a fuel 40 will be colored red (hatching of a left riser shows at drawing 6 (A)). And if the fuels 40 in a combustion chamber 24 decrease in number while a generation of electrical energy of a fuel cell 20 is performed, the concentration of a color will become high and a fuel 40 will change to deep red (a cross line shows in drawing 5 (B)).

[0077]

In addition, although the fuel cell 20 concerning the 1st operation gestalt explained the example in which the coloring agent is beforehand added by the fuel 40, the coloring agent is beforehand put in in

the combustion chamber 24, and the same effectiveness is acquired even if it makes it melt into the supplied fuel 40.

[0078]

Next, the methanol direct mold fuel cell (henceforth a fuel cell) 50 concerning the 2nd operation gestalt of this invention is explained. in addition, the same configuration as the 1st operation gestalt -- ** -- the same sign is attached and explanation is omitted.

[0079]

As shown in drawing 7 , a fuel cell 50 turns an air chamber 26 side to the transparence member 18, and the applied part 61 of a digital camera 60 is equipped with it. An air chamber 26 is adjoined, and the stripping section 52 which collects by-products, such as a carbon dioxide (CO2) generated by the combustion chamber 24 and water (H2O) generated by the air chamber 26, faces the transparence member 18, and is arranged by the fuel cell 50.

[0080]

The insertion hole 54 faces a filter 32, it is prepared in the lower part of a stripping section 52, and a gas keeps company with it between an air chamber 26 and a stripping section 52. Moreover, the exhaust pipe 56 which extends from a combustion chamber 24 is inserted in a stripping section 52, and a gas is sent into a stripping section 52 from a combustion chamber 24.

[0081]

Moreover, the stripping section 52 is filled up with the water absorption polymer 58. Neutral BTB liquid is absorbed by this water absorption polymer 58, and the water absorption polymer 58 is colored it green. In addition, like the 1st operation gestalt, it may change to a BTB solution and a litmus solution may be used.

[0082]

As for drawing 8 (A), a fuel is supplied, and the BTB solution shows the green condition neutrally. If used for a generation of electrical energy of a fuel, like the 1st operation gestalt, a carbon dioxide (CO2) will be generated in a combustion chamber 24, and water (H2O) will be generated by the air chamber 26.

[0083]

The carbon dioxide in a combustion chamber 24 flows into a stripping section 52 through an exhaust pipe 56, and the water in an air chamber 26 penetrates a filter 32, and flows into a stripping section 52. And a carbon dioxide dissolves in the collected water and the water in BTB liquid, becomes acidity, and makes BTB liquid color yellow from green within a stripping section 52.

[0084]

By this, since the whole water absorption polymer 58 will become yellow if a fuel decreases as shown in drawing 8 (B), the residue of a fuel can be grasped easily visually and it is not necessary to read a color by a color detection sensor etc. Moreover, since it was made to change the color of the whole water absorption polymer 58, even if it leans a digital camera 60 vertically and horizontally, the condition of a color can always be checked through the transparence member 18.

[0085]

Moreover, the upper part of a stripping section 52 penetrates a gas, and the liquid is wide opened with the vapor-liquid-separation film 62 to intercept. For this reason, internal pressure goes up a stripping section 52 above with the collected carbon dioxide, a carbon dioxide and water do not flow backwards to a combustion chamber 24 and an air chamber 26, or a stripping section 52 does not explode.

[0086]

In addition, the class of the fuel concerning this invention or coloring agent is not limited to each above-mentioned operation gestalt, and can be changed into arbitration. Moreover, although the above-mentioned operation gestalt explained a configuration which supplies a fuel to a fuel cell directly, as shown in drawing 9 and drawing 10 , a configuration which loads a fuel cell 20 (50) with the fuel pack 47 which stores a fuel is also applicable. In this case, the recovery room which collects the by-products generated with a fuel cell may be prepared in a fuel pack.

[0087]

Furthermore, besides a digital camera, the electronic equipment or the camera concerning the above-mentioned operation gestalt is applicable similarly, even if it is a film-based camera, a digital camcorder, a cellular phone, a personal computer, PDA (Personal Digital Assistance), etc. What is necessary is just to make it equip the keyboard case 72 side with a fuel cell 20 (50) in the case of the cellular phone 70 with a camera equipped with the image pick-up section 49 which consists of a lens 35 and a shutter 31, as shown in drawing 11 .

[0088]

[Effect of the Invention]

Since the color of a fuel changes according to the amount of the fuel used according to this invention as explained above, by recognizing the color of a fuel other than the oil-level level of a fuel visually, the amount of the fuel used can grasp easily and convenience improves. Moreover, according to this invention, mistaking the fuel of a different class to it and refueling it, since the coloring agent for identifying the fuel of a different class is added to the assignment fuel with which a fuel cell is filled up is prevented.

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the digital camera equipped with the fuel cell concerning the 1st operation gestalt.

[Drawing 2] It is the circuit diagram of the digital camera equipped with the fuel cell concerning the 1st operation gestalt.

[Drawing 3] It is the sectional view showing the rough configuration in the condition of having equipped electronic equipment with the fuel cell concerning the 1st operation gestalt.

[Drawing 4] (A) It is the sectional view showing the condition of having filled up with a methanol, water, and a bromthymol blue solution drawing 1 and the combustion chamber shown in 2.

(B) It is the sectional view showing the condition of having filled up with a methanol, water, and a bromthymol blue solution drawing 1 and the combustion chamber shown in 2.

[Drawing 5] (A) It is the sectional view showing the condition of having filled up with a methanol, water, and a litmus solution the combustion chamber shown in drawing 1 and drawing 3 .

(B) It is the sectional view showing the condition of having filled up with a methanol, water, and a litmus solution the combustion chamber shown in drawing 1 and drawing 3 .

[Drawing 6] (A) It is the sectional view showing the condition of having filled up with a methanol, water, and a color the combustion chamber shown in drawing 1 and drawing 3 .

(B) It is the sectional view showing the condition of having filled up with a methanol, water, and a color the combustion chamber shown in drawing 1 and drawing 3 .

[Drawing 7] It is drawing showing the fuel cell concerning the 2nd operation gestalt.

[Drawing 8] (A) It is drawing showing the fuel cell concerning the 2nd operation gestalt.

(B) It is drawing showing the fuel cell concerning the 2nd operation gestalt.

[Drawing 9] It is the perspective view showing a digital camera equipped with the fuel cell concerning the 1st and 2nd operation gestalt.

[Drawing 10] It is the circuit diagram of a digital camera equipped with the fuel cell concerning the 1st and 2nd operation gestalt.

[Drawing 11] It is drawing showing a cellular phone with a camera equipped with the fuel cell concerning the 1st and 2nd operation gestalt.

[Description of Notations]

10 Digital Camera (Electronic Equipment, Camera)
18 Transparence Member
20 Fuel Cell
21 Negative-Electrode Electrode (Fuel Electrode or Cell Section)
22 Positive-Electrode Electrode (Air Pole or Cell Section)
24 Combustion Chamber
25 Outer Wall
36 Proton Electric Conduction Film (Electrolyte Membrane or Cell Section)

38 Color Sensor (Detection Means)
40 Fuel
42 Pressure Valve (Pressurization Means)
50 Fuel Cell
52 Stripping Section
58 Water Absorption Polymer (Absorption Member)
60 Digital Camera (Electronic Equipment, Camera)
62 Vapor-Liquid-Separation Film
70 Cellular Phone with Camera (Electronic Equipment, Personal Digital Assistant, Camera)

[Translation done.]